

Serial No. 10/647,262
Amendment dated January 16, 2007

Atty. Docket No. DOC.016DC
Reply to Office action of July 13, 2006

AMENDMENTS TO THE CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

Listing of Claims:

Claims 1-14 (Cancelled)

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15. (Currently Amended) A method of making optical elements on a wafer level comprising:
making a master including a plurality of optical elements on a substantially planar surface thereof;

simultaneously imprinting a replica of said plurality of optical elements in a [[an]] material by applying the substantially planar surface of the master to the imprintable material;
providing a support substrate for the replica;
hardening the imprintable material to form a hardened replica;
removing the master from the hardened replica; and
separating the hardened replica on the support substrate to form individual optical elements, each individual optical element including the hardened replica and the support substrate, ~~wherein the hardened replica is adhered to the support substrate sufficiently to avoid delamination therefrom during said separating.~~

16. (Currently Amended) The method as recited in claim 15, further comprising providing said imprintable material in a thin film on the substantially planar [[a]] surface of the master prior to the imprinting.

17. (Currently Amended) The method as recited in claim 15, further comprising wherein said imprinting includes:
providing the imprintable material to the substantially planar surface of the master [[,]];
providing an adhesion promoter on the support substrate; and [[;]]
contacting the substantially planar [[a]] surface of the master having the imprintable material thereon to a surface of the substrate having the adhesion promoter thereon.

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18. (Previously Presented) The method as recited in claim 15, wherein the support substrate includes fiducial marks, the method further comprising aligning the master to the fiducial marks.
19. (Original) The method as recited in claim 15, further comprising coating said replica with an anti-reflective coating.
20. (Currently Amended) The method according to claim 15, further comprising selectively removing ~~material from~~ or adding material to said replica in a predetermined pattern.
21. (Currently Amended) The method according to claim 20, wherein said selectively removing ~~material from~~ or adding occurs prior to said imprinting.
22. (Currently Amended) The method according to claim 20, wherein said selectively removing ~~material from~~ or adding occurs after said imprinting.
23. (Currently Amended) The method according to claim 20, wherein said selectively removing ~~material from~~ or adding includes providing metal pads on a surface opposite a side of said replica subject to said imprinting.
24. (Currently Amended) The method as recited in claim 15, wherein said imprinting ~~embossing~~ includes imprinting ~~embossing~~ both sides of the support substrate.
25. (Currently Amended) The method as recited in claim 24, wherein a different master is used for imprinting ~~imprintable~~ either side of said both sides.
26. (Previously Presented) The method as recited in claim 25, wherein a first master includes diffractive optical elements and a second master includes refractive optical elements.

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27. (Previously Presented) The method as recited in claim 41, further comprising providing fiducial marks on both the wafer master and the support substrate.

28. (Previously Presented) The method according to claim 41, further comprising: confirming alignment of the support substrate and the wafer master in a mask aligner; and tacking together the support substrate and wafer master at discrete locations once alignment is confirmed.

29. (Previously Presented) The method according to claim 28, further comprising removing the support substrate and the wafer master from the mask aligner after said tacking and then hardening the imprintable material.

30. (Previously Presented) The method according to claim 15, wherein said imprinting includes initially bringing the master into contact with only a portion of the support substrate, with the imprintable material on at least one of the master and the support substrate, and then bringing the entire master into contact with the support substrate with the imprintable material therebetween.

31-37. (Cancelled).

38. (Withdrawn) An optical element formed by the process recited in claim 15.

39-40. (Cancelled).

41. (Original) The method as recited in claim 15, wherein said master is a wafer.

42. (Original) The method as recited in claim 20, wherein said selectively removing or adding is lithographic.

43. (Previously Presented) The method as recited in claim 20, wherein said selectively removing or adding includes selectively removing imprintable material.

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44. (Currently Amended) The method as recited in claim 43, wherein said selectively removing imprintable ~~embossable~~ material includes providing metal in a pattern on ~~[[os]]~~ said master and, after said embossing, removing away unfixed imprintable material.

45. (Previously Presented) The method as recited in claim 43, wherein said selectively removing or adding includes adding material where imprintable material was removed.

46. (Previously Presented) The method as recited in claim 28, wherein said tacking includes providing localized fixing of said imprintable material.

47-50. (Cancelled).

51. (Currently Amended) The method according to claim 15, wherein said imprinting includes initially bringing a portion of the substantially planar surface of the master into contact with a center of the support substrate, with the imprintable material on at least one of the master and the support substrate, and then bringing the entire substantially planar surface of the master into contact with the support substrate with the imprintable material therebetween.

52. (Currently Amended) The method according to claim 15, wherein said imprinting includes initially bringing a portion of the substantially planar surface of the master into contact with an edge of the support substrate, with the imprintable material on at least one of the master and the support substrate, and then bringing the entire substantially planar surface of the master into contact with the support substrate with the imprintable material therebetween

53. (Previously Presented) A method of making optical elements comprising:
making a master including an optical element;
imprinting a replica of said optical element in an imprintable material by applying the master to the imprintable material;
providing a support substrate for the replica;

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confirming alignment of the support substrate and the master;
tacking together the support substrate and master at discrete locations once alignment is confirmed;
fixing the imprintable material to form a hardened replica; and
removing the master from the hardened replica.

54. (Previously Presented) The method according to claim 53, said confirming alignment of the support substrate and the wafer master is done in a mask aligner.

55. (Previously Presented) The method according to claim 54, further comprising removing the support substrate and the wafer master from the mask aligner after said tacking and then fixing the imprintable material.

56. (Previously Presented) The method according to claim 53, wherein said master includes a plurality of optical elements, the method further comprising separating the fixed replica on the support substrate to form individual optical elements, each individual optical element including the hardened replica and the support substrate, wherein the hardened replica is adhered to the support substrate sufficiently to avoid delamination therefrom during said separating.

57. (Currently Amended) A method of making optical elements comprising:
making a master including an optical element on a substantially planar surface thereof;
imprinting a replica of said optical element in an imprintable material by applying the master to the imprintable material;

providing a support substrate for the replica, said imprinting further including initially bringing a portion of the substantially planar surface of the master into contact with only a portion of the support substrate, with the imprintable material on at least one of the master and the support substrate, and then bringing the entire substantially planar surface of the master simultaneously into contact with the support substrate with the embossable material therebetween;

fixing the imprintable material to form a hardened replica; and

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removing the master from the hardened replica.

58. (Currently Amended) The method according to claim 57, wherein said initially bringing the portion of the substantially planar surface of the master into contact includes contacting a central portion of the support substrate.

59. (Currently Amended) The method according to claim 57, wherein said initially bringing the portion of the substantially planar surface of the master into contact includes contacting a peripheral portion of the support substrate.

60. (Previously Presented) The method according to claim 57, wherein said master includes a plurality of optical elements, the method further comprising separating the hardened replica on the support substrate to form individual optical elements, each individual optical element including the hardened replica and the support substrate, wherein the hardened replica is adhered to the support substrate sufficiently to avoid delamination therefrom during said separating.

61. (New) The method according to claim 15, wherein the hardened replica is adhered to the support substrate sufficiently to avoid delamination therefrom during said separating.

62. (New) The method according to claim 16, wherein said imprintable material covers the plurality of optical elements, providing a substantially smooth upper surface on the substantially planar surface of the master.

63. (New) The method according to claim 53, wherein said imprintable material is provided on the substantially planar surface of the master, covering the optical element, providing a substantially smooth upper surface on the substantially planar surface of the master.

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64. (New) The method according to claim 57, wherein said imprintable material is provided on the substantially planar surface of the master, covering the optical element, providing a substantially smooth upper surface on the substantially planar surface of the master